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21839	7590	10/07/2004	EXAMINER	
BURNS DOANE SWECKER & MATHIS L L P			MOORE, IAN N	
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ALEXANDRIA, VA 22313-1404			2661	

DATE MAILED: 10/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/828,897

Applicant(s)

LINDOFF, BENGT

Examiner

Ian N Moore

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-8, 14-16 and 19-21 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 9-13, 17, 18 and 22-26 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/02, 7/01.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. Figure 1A and 1B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Selectively Controlled Modulation Distortion to an IQ baseband signal.

3. Applicant is reminded of the proper language and format for an abstract of the disclosure. The abstract does not fully describe the disclosure sufficiently regarding the inventive method and apparatus. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 1,7,14 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas (U.S. 6,400,233) in view of Paik (U.S. 5,363,408).

Regarding claim 1 and 14, Thomas'233 discloses an apparatus (see FIG. 1, a distortion modulation arrangement in IQ modulator) for generating a radio frequency signal (see FIG. 1, Radio Signal at the output of combiner 46), comprising:

logic that generates a resultant baseband signal (see FIG. 1, I-signal' or Q-Signal') by selectively generating either a non-distorted complex-valued baseband signal or a distorted complex-valued baseband signal (see FIG. 1, a distorted compensated I-signal' and Q-Signal' is the complex-value baseband signal; note that the distorted compensated I-signal' and Q-Signal' is exclusively/selectively created/generated in order to reduce the distortion; see col. 4, lines 28-55),

wherein selective generation is based upon the value of information in the sequence of information (see col. 4, lines 22-65; note that I-Signal' and Q-Signal is created base upon the distorted information and the value of weighting factors in the sequence of signal/information); and

logic that generates the radio frequency signal (see FIG. 1, radio signal at the output of combiner 46) from the resultant baseband signal (see FIG. 1, distorted compensated I-Signal and Q-Signal; see col. 5, lines 9-20),

wherein for any given sequence of information represented by the distorted complex-valued baseband signal (see col. 4, lines 28-55; note that the distorted compensated I-Signal' Q-Signal' is represented by a specific sequence of information since the I-Signal' and Q-Signal' is generated by adding three parameter at the adder 8 or 16 (e.g. $I\text{-signal}' = I\text{-signal} + A \cdot (I\text{-signal})^3 + D \cdot (Q\text{-signal})^3$), the distorted complex-valued baseband signal deviates from a reference baseband signal (see FIG. 1, input I-signal or Q-Signal) corresponding to the given sequence of information (see col. 4, line 10 to col. 5, lines 32; note that both I-Signal' and Q-Signal are different/deviate from original/reference input I-Signal and Q-Signal which corresponds to given/original sequence of information).

Thomas'233 does not explicitly disclose bits.

However, the above-mentioned claimed limitations are taught by Paik'408. In particular, Paik'408 teaches the values of the information bits in the sequence of information bits (see FIG. 3-5; the values (1 and 0) of the information bits are in the sequence of information bits m_0 - m_5 , see signal point 55 in FIG. 3 which has sequence of information bits 001100) and any given sequence of information bits represented by the information signal (see FIG. 2, QAM Mapper 40 maps between the sequence of information bits (i.e. m_0 - m_5) and the information/baseband signal (i.e. I and Q signals); see col. 7, line 42 to col. 7, lines 40).

In view of this, having the system of Thomas'233 and then given the teaching of Paik'408, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Thomas'233, by proving the mapping between the information bits and the information baseband signal, as taught by Paik'408. The motivation to combine is to obtain the advantages/benefits taught by Paik'408 since Paik'408 states at col. 3, line 40-67 that such modification would provide a high data rate, with minimum bandwidth occupancy and very high data reliability by utilizing the mechanism of automatically and reliability detecting and mapping the order of QAM.

Regarding claims 7 and 20, Paik'408 discloses an M-QPSK architecture or an M-QAM architecture (see col. 1, lines 5-7; M-ray QAM communication system).

5. Claims 2,3,6,15,16, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas'233 and Paik'408, as applied to claims 1 and 14 above, and further in view of Masheff (U.S. 4,696,017).

Regarding claims 2 and 15, the combined system of Thomas'233 and Paik'408 discloses wherein for any given sequence of information bits represented by the distorted complex-valued baseband signal, the reference baseband signal corresponding to the given sequence of information bits set forth in the rejection of Claims 1 and 14 as described above. Paik'408 discloses the given sequence of information bits comprises a first group of information bits (see FIG. 3, a group information bits associated with Q-signal, vertical axis)

and a second group of information bits (see FIG. 4, a group information bits associated with I-signal, horizontal axis); see col. 7, lines 15-30.

Neither Thomas'233 nor Paik'408 explicitly discloses a distorted complex-valued signal point that represents the first group of the given sequence of information; a reference complex-valued signal point that represents the first group of the given sequence of information; and the distorted complex-valued signal point is different from the reference complex-valued signal point.

However, the above-mentioned claimed limitations are taught by Masheff'017. In particular, Masheff'017 teaches the given sequence of information bits comprises a first group of information bits (see FIG. 2, a group information bits associated with Q-signal, vertical axis) and a second group of information bits (see FIG. 2, a group information bits associated with I-signal, horizontal axis);

the distorted complex-valued baseband signal (see FIG. 2, quadrature-phase signal vector 62) comprises a distorted complex-valued signal point (see FIG. 2, the intersection point at vector 62) that represents the first group of the given sequence of information bits (see FIG. 2, Q-signal axis, note that the intersection point corresponds/represents the Q-signal group of information bits);

the reference baseband signal (see FIG. 2, Q-Ideal signal) comprises a reference complex-valued signal point (see FIG. 3, the intersection point between Q-ideal axis and the circle) that represents the first group of the given sequence of information bits (see FIG. 2, Q-signal axis, note that the intersection point on Q-ideal corresponds/represents the Q-signal group of information bits); and

the distorted complex-valued signal point is different (see FIG. 2, quadrature-phase error vector 64) from the reference complex-valued signal point (see FIG. 2, the intersection point of vector 62 is differ from the intersection point of Q-ideal by the quadrature-phase error vector 64); see col. 4, lines 10-51.

In view of this, having the combined system of Thomas'233 and Paik'408, then given the teaching of Masheff'017, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined system of Thomas'233 and Paik'408, by providing a quadrature-phase signal vector 62 intersection point which corresponds to Q-signal information bits, a Q-ideal signal point which corresponds to Q-signal information bits, and the both points are differ by a quadrature-phase error vector 64, as taught by Masheff'017. The motivation to combine is to obtain the advantages/benefits taught by Masheff'017 since Masheff'017 states at col. 1, line 25 to col. 2, lines 19 that such modification would improve signal generator which produces accurate quadrature signal outputs for use in high precision receiver applications.

Regarding claims 3 and 16, the combined system of Thomas'233, Paik'408 and Paik'408 discloses wherein the distorted complex-valued signal point differs from the reference complex-valued signal point as set forth in the rejection of Claims 1 and 14 above. Masheff'017 further discloses differs by a predetermined complex-valued distortion amount (see FIG. 2, quadrature-phase error vector 64; note that the intersection point of vector 62 is differ from the intersection point of Q-ideal by the predefined quadrature-phase error vector 64; see col. 4, lines 10-51.)

In view of this, having the combined system of Thomas'233 and Paik'408, then given the teaching of Masheff'017, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined system of Thomas'233 and Paik'408 as taught by Masheff'017 for the same purpose and motivation as set forth above in claims 2 and 15.

Regarding claims 6 and 19, the combined system of Thomas'233 and Paik'408 discloses all aspects of the claimed invention set forth in the rejection of Claims 1 and 14 as described above.

Neither Thomas'233 nor Paik'408 explicitly discloses generating distorted amplitude and phase signals, wherein at least one of the distorted amplitude and phase signals has a lower bandwidth than a corresponding bandwidth of reference amplitude and phase signals generated from the reference signal.

However, the above-mentioned claimed limitations are taught by Talwar'838. In particular, Talwar'838 teaches generating distorted amplitude (see FIG. 1, amplitude signal 16c) and phase signals (see FIG. 1, phase signal 16b) from the baseband signal (see FIG. 1, digital input); see col. 3, lines 45 to col. 4, lines 22),

wherein at least one of the distorted amplitude and phase signals has a lower bandwidth than a corresponding bandwidth of reference amplitude (see FIG. 1, the amplitude correction/reference words of the signal stores in the amplitude memory 50) and phase signals (see FIG. 1, the phase correction/reference words of the signal stores in the phase memory 28) generated from the reference baseband signal (see FIG. 2, Amplitude ROM 50

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and Phase Rom 28 and the a combined Q-ideal and I-ideal signal; note that the reference/correction signal is the ideal signal with no errors); see col. 4, lines 25-51); also note that both amplitude and phase signals have undesirable errors, but whereas the reference/correction signal is the ideal signal with no errors. Thus, it is clear that the erroneous signal has lesser bandwidth than the ideal signal since the part of the bandwidth is being utilized to carry undesired erroneous phase and amplitude such as noise and interferences.

In view of this, having the combined system of Thomas'233 and Paik'408, then given the teaching of Masheff'017, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined system of Thomas'233 and Paik'408, by providing a mechanism of generation erroneous amplitude and phase signals, generation amplitude and phase reference/correction signals, and the correcting the erroneous signal in accordance with the reference/correction signal in order to recover the bandwidth loss due to the noise and interferences, as taught by Masheff'017. The motivation to combine is to obtain the advantages/benefits taught by Masheff'017 since Masheff'017 states at col. 1, line 25 to col. 2, lines 19 that such modification would improve signal generator which produces accurate quadrature signal outputs for use in high precision receiver applications.

6. Claims 8 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas'233 and Paik'408, as applied to claims 1 and 14 above, and further in view of Turcotte (U.S. 6,441,684).

Regarding claims 8 and 21, the combined system of Thomas'233 and Paik'408 discloses all aspects of the claimed invention set forth in the rejection of Claims 1 and 14 as described above.

Neither Thomas'233 nor Paik'408 explicitly discloses generating polar phase and amplitude signals and generating the radio frequency signal from the polar phase and amplitude signals.

However, the above-mentioned claimed limitations are taught by Turcotte'694. In particular, Turcotte'694 teaches generating polar phase (see FIG. 2, Rectangular-to-polar conversion unit 52 converts the rectangular signal to Phase signal and transmits towards NCO 54) and amplitude signals (see FIG. 2, Rectangular-to-polar conversion unit 52 converts the rectangular signal to amplitude signal and transmits towards D/A converter 56) from the resultant baseband signal (see FIG. 2, rectangular signal receives to conversion unit 52); see col. 2, lines 50-65) and

generating the radio frequency signal (see FIG. 1, Modulated RF) from the polar phase and amplitude signals (see FIG. 2, D/A converter 56 combines polar amplitude and phase signal and the signal is smooth out by low pass filter 58. See FIG. 1, the signal outputted from low pass filter is the modulated radio signal; col. 2, line 15-65).

In view of this, having the combined system of Thomas'233 and Paik'408, then given the teaching of Turcotte'694, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined system of Thomas'233 and Paik'408, by providing a rectangular-to-polar in the radio modulator, as taught by Turcotte'694. The motivation to combine is to obtain the advantages/benefits taught by

Turcotte'694 since Turcotte'694 states at col. 1, line 30-60 that such modification would have the advantages of introducing less distortion due to filter dissimilarities in the in-phase and quadrature-phase analog path, better gain and phase balance and retain the advantages of direct digital synthesis while at the same time reducing the spurious content of the oscillator.

Allowable Subject Matter

7. Claims 4-5, 9-13, 17-18, 22-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

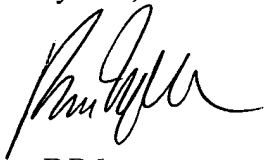
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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ian N Moore whose telephone number is 571-272-3085. The examiner can normally be reached on M-F: 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on 571-272-3078. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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9/29/04

**BRIAN NGUYEN
PRIMARY EXAMINER**